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been reported as 30', or 1'10" per year. At Lincoln Center, from 1874 to 1884, the change was 33', or 3'18" per year. Observations extending over shorter periods, when coupled with these, make me think that the rate is as above stated, 3' per year.

In order to secure results that can be compared, there ought to be established at each county seat a *true* meridian, permanently marked. The lines should be laid out carefully by competent persons, and with better instruments than are usually found in the hands of surveyors. The State by an appropriation could well provide for the actual expenses of such work, and the University could furnish the instruments and the men to do it. Then each surveyor should receive from the county a just compensation for his labor in taking the quarterly observations, and these should be taken with more system than is now done. To call the attention of the surveyor to the present law is of no avail, as the University has proved by sending out yearly a table of "Pole Star Times" and asking for compliance with the law.

NOTE ON THE SECOND SETTING OF CEMENT.

BY B. J. DALTON AND F. O. MARVIN, LAWRENCE.

It is proposed to study the action of cements, which, after having set, have again been mixed up into mortar and allowed to permanently harden. Some masons claim that this second setting of the cement increases its strength. On looking up what has been written on the subject, we find that modern engineers in their specifications demand that mortar which has set shall not be used. Yet we have found no statement of reasons, nor any record of tests comparing the strength of samples of the same cement; some having set once and others twice. We shall at this time report progress only, as too small a number of briquetts have been broken so far to enable us to draw safe conclusions. A full description of methods and results is then reserved for a future report, merely noticing now that the indications are that, with the cements used, a second setting injures their strength.

A PRELIMINARY STUDY OF "HOT WINDS."

BY SERGT. T. B. JENNINGS,
Signal Corps, Ass't Director Kansas Weather Service.

In the study of this phenomenon, the first question to decide is, what are "hot winds"? A careful search through all the meteorological works at my command fails to reveal any definition. Shall every warm wind that proves a destructive blast to vegetation be termed a "hot wind"? I use the term "proves" under protest, because there are other conditions the effects of which are sometimes ascribed to "that hot wind."

In 1866, my first year in Kansas, we had in the eastern part of the State some "hot winds." During that summer our prevailing wind for about 60 days was southwest, and in that time we had a hot wind of eight days' duration, each day the temperature in Franklin county rising to upwards of 100°, and not falling below 80° during the nights. On the fourth day a long-range thermometer was laid across two sticks about six inches above the ground, on a path where there was not even dead grass. Its mercurial column rapidly extended, until it finally reached the limits of the instrument, 140°, when, after enduring the confinement for a short period, it found escape by bursting the bulb, and ended the experiment. The time was

somewhere about 2 to 3 P.M. Still I would not require a wind to reach the temperature of 140° to be honored with our title. But after studying this matter more or less for some time, it has been decided for the purposes of this paper that winds must reach the temperature of 98° to be designated as "hot winds."

After a correspondence, extending through the past winter, on this matter, between the meteorologist of the U. S. Geological Survey and the Kansas Weather Service, it was decided in the spring to issue a joint circular and a blank form for report of these winds. The following is the circular:

(The United States Geological Survey, in cooperation with the Kansas Weather Service.)

WASHINGTON, D. C., } June 15, 1889.
TOPEKA, KANSAS. }

DEAR SIR: The widespread prevalence of "hot winds" during recent seasons, attended by the partial or complete destruction of the vegetation in their path, has awakened the attention of agriculturists and meteorologists to the need of a better knowledge of their origin and extent, with a view to the possible amelioration of their destructive effects. Many theories have been advanced as to their "cause and cure," but more accurate and reliable information regarding them seems necessary before giving adherence to any.

The U. S. Geological Survey, in coöperation with the Kansas Weather Service, purposes to collect the requisite statistics of the "hot winds" of the present season, and to this end requests voluntary reports of these phenomena upon blanks which have been prepared for the purpose. A supply of these blanks, with return envelopes, accompanies this letter. The scope of the information desired is indicated by the questions on the blanks.

The preparation of these reports, if made as full and complete as circumstances permit, will be a valuable service to the bureaus undertaking the investigation, and it is hoped will result in practical benefit to the territory affected.

The general results of the work will be furnished to each observer.

T. B. JENNINGS, (Signal Corps,) *Assistant Director Kansas Weather Service.* GEORGE E. CURTIS, Meteorologist, *U. S. Geological Survey.*

(U. S. Geological Survey, in cooperation with the Kansas Weather Service.)

REPORT OF HOT WINDS

Station ___, county ___, State ___.

Give distance and direction from nearest post-office. —

Dates of discontinuance —

Time of beginning —: (Give time used — whether B. B. or sun.)

Time of beginning, —
Time of ending —

State whether continuous or discontinuous—especially whether ceasing during night

State whether continuous or discontinuous—especially whether ceasing during night.
Direction from —. (Nearest point north, northeast, east, southeast, south, southwest, west, or northwest.)

Force—Give by scale number the prevailing force, —; the maximum force, —; the time of maximum force. —.

Temperature, —. (Give highest temperature in the shade.)

Remarks. (State effects on vegetation, and any other facts pertinent to the subject.)

A copy of the blank form for "Report of Hot Winds" also accompanies this paper. Criticisms are invited, as it is the pioneer in its line; suggestions will be thankfully received, and valid improvements adopted.

In answer to this circular a number of "hot winds" have been reported. During July these occurred on the 5th, 6th and 7th, 15th, 16th and 17th, and 26th and 27th, that of the 15th, 16th and 17th being the most extensive and disastrous.

A résumé will be interesting. On the morning of the 5th there is an area of diminished pressure central near the Black Hills, in Dakota. Its indraught extends to the lake region on the east and to Texas on the south. At Bismarck the wind is northeast and the barometer 29.56; at Rapid City the wind is west and barometer 29.52; while over Lake Erie the barometer is 30.20, and in Texas 30.06. By the time of the evening observation, 7 p. m. central time, a change has appeared on the Government maps. A *hot wave* (remember the time of day — 7 p. m., that is after 6 p. m., actual time) extends from North Platte, Neb., to Fort Custer, Mon., covering the southwest half of Dakota, with temperatures as follows, viz.: North Platte 94°, Val-

entine 96°, Huron, Dak., 94°, Bismarck 90°, Fort Sully 98°, Rapid City 92°, and Fort Custer 90°. An area of lower barometer has developed in the mountain regions of Idaho, Montana, and Wyoming, or has advanced from the west and is now central in that region, drawing the wind from the south across Kansas and Nebraska at from 16 to 24 miles per hour. During this afternoon occurred some *hot winds* in the western counties of our State. In Morton, Stevens, Grant and Stanton the temperature reached 99°, in Trego and Gove 100°, and in Thomas 102°. At North Platte, Neb., it reached 102°, and at Valentine 106°.

On the morning of July 6th this area of low pressure has moved southeastward, and is now central in the northwestern part of Nebraska and southwestern part of Dakota. This being Saturday, no afternoon map was issued. The 7th being Sunday, no morning map was issued, but the afternoon map shows the low pressure divided, a part being central in northwestern Iowa, and the other over the Panhandle of Texas, while the general current of the wind over Kansas is from the southeast. The maximum temperatures of this day were lower in Nebraska than in Kansas. At Dodge City it was 94°, at Gibson 105°, at Lisbon (Gove county) 100°, at Offerle (Edwards county) 98°, at Englewood 97°, at Hugoton 97°, and at Colby 98°. The general current of the wind over Kansas was changed to east and northeast, responding to an area of low pressure over the Panhandle and New Mexico.

The rain of the 8th, and the high pressure following, materially lowered the temperature for the next few days.

An extensive area of low pressure in the mountain regions on and after the morning of the 12th, kept our winds southerly until the night of the 17th-18th, the maximum temperatures of the 17th, being the maximum for this hot wave, were as follows: North Platte 100°, Colby, Kansas, 103°, Lisbon 108°, Gibson 114°, Dodge City 100°, Offerle 103°, Hugoton 100°, Englewood 101.5°, Fort Elliott, in the Panhandle, 102°, Fort Sill, Indian Territory, 96°, and El Paso, Texas, 100°.

But as this paper is only preliminary to a fuller discussion of this subject at our next annual meeting, its object at this time being to show the line and method of research, its purpose is deemed fulfilled.

SOME TESTS OF CEMENTS MANUFACTURED IN KANSAS.

BY E. C. MURPHY, STATE UNIVERSITY, LAWRENCE.

The tests which form the basis of this paper were made by the writer at the State University during the month of July, 1889.

It was the writer's intention to test all the cements manufactured in Kansas. Cement is reported as having been manufactured at Fort Scott, Kansas City, Manhattan, Alma, and Topeka. Only those manufactured at Fort Scott and Kansas City could be found in the market at this time, and hence they are the only ones tested.

In order to get the relative value of these two cements, and their value compared with a standard cement, I have tested with them, under the same conditions, a German Portland cement.

Much care has been taken to have the conditions under which the tests were made, the same for each cement. To this end the following method of testing was used: The water used in mixing the cement, as well as that in which the specimens were placed, was left in the testing-room (one of the large rooms of the main University building) for 24 hours before using, in order to have a uniform temperature. A bricket of each cement was then mixed to as nearly as possible the same degree of plasticity; the mold in which the bricket was made was filled, placed on a marble